

NON-PUBLIC?: N
ACCESSION #: 9302010165
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Braidwood 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000456

TITLE: Reactor Trip Due to Logic Card Failure in Train B Solid
State Protection System
EVENT DATE: 01/07/93 LER #: 93-001-00 REPORT DATE: 01/29/93

OTHER FACILITIES INVOLVED: None DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: A. Stogsdill, Technical Staff TELEPHONE: (815) 458-x2843
Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: IBG COMPONENT: IBISSW MANUFACTURER: W120
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On January 7, 1993 while performing Unit One Reactor Coolant Pump Underfrequency Quarterly Surveillance, Unit One experienced a Reactor Trip. The failed component was on the A215 Universal Logic Card which is the decision maker for the 2 out of 4 logic in the RCP-UF circuit. The A215 card was replaced and the SSPS Bi-monthly Diagnostics test was reperformed to ensure the replacement card functioned properly and verify the complete SSPS system was operational. The failed Universal Logic card was sent to the vendor for a detailed failure analysis. There have been previous occurrences of spurious ESF actuations due to problems in the Train B SSPS circuitry.

END OF ABSTRACT

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A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: Braidwood 1; Event Date: January 7, 1993

Event Time: 1314

Mode: 1 - Power Operation; Rx Power: 100%

RCS AB! Temperature/Pressure: NOT / NOP;

B. DESCRIPTION OF EVENT:

There were no systems or components inoperable at the beginning of the event which contributed to the severity of the event.

Prior to the event, a pre-job briefing was conducted between the Unit Nuclear Station Operator (NSO) and an extra NSO assigned to perform the Control Room functions associated with the test.

On January 7, 1993 while performing Technical Surveillance 1BwVS 3.1.1-6 (Unit One Reactor Coolant Pump Underfrequency Quarterly Surveillance), Unit One experienced a Reactor Trip.

The Reactor Coolant Pump Underfrequency Surveillance (RCP-UF) performs verification of the Trip Actuating Device Operational Test of the RCP bus Underfrequency input to the Solid State Protection System (SSPS). The RCP Underfrequency Reactor Trip Coincidence logic is 2 out of 4 buses with permissive P-7. Each RCP bus contains an A-Train and B-Train UF Relay. Testing is performed on each relay independently with verification of control room annunciation and reset. This sequence is repeated for all four of the RCP buses in 1BwVS 3.1.1-6.

On the day of the event, the RCP-UF Surveillance was being performed by three Technical Staff Engineers and supported by a Nuclear Station Operator. Two engineers were performing the relay actuations in the 6.9KV Switchgear Room and the third engineer and

NSO were at the Main Control Board to verify and acknowledge alarms generated, along with the underfrequency bistables associated with each 6.9 KV bus. Communications were maintained throughout the testing via sound powered headsets. Testing was completed satisfactorily on bus 156 and 157 relays. Testing was then completed satisfactorily on bus 158 A-Train relay. At 1314, upon actuation of bus 158 B-Train relay, a trip signal was generated resulting in a Reactor Trip and a trip of all four RCP'S. Procedure 1BwEP-0, Unit One Reactor Trip / Safety Injection, was entered. The relay was reset and surveillance stopped. operations immediately

proceeded to stabilize the plant and re-start the 1D RCP on bus 159. As the unit was being stabilized, Tech Staff and Operations departments began an investigation to find the root cause of the event.

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After initial interviews with participants and a thorough review of the circuit, surveillance, and sequence of events recorder, it appeared there had been a logic failure and not a personnel error. After the plant was stabilized in Mode 3, RCP-UF Surveillance was reperformed in an effort to recreate the failure and collect more data. The surveillance was performed satisfactorily, which indicated an intermittent logic problem. At this time a task force was established to develop a troubleshooting plan.

Technical Staff Engineers developed a three part action plan consisting of UF relays, control room annunciation and SSPS troubleshooting. Each part of the plan was assigned to independent teams with expertise in that area of concern. The teams then expanded and detailed their portion of the action plan to ensure effective isolation of the logic failure. This plan was then reviewed and approved by Station upper management and offsite consultants. Once approved, the troubleshooting plans were implemented.

Team 1 comprised of Tech Staff Engineers and OAD Engineers conducted a complete investigation of all equipment in the 6.9KV Switchgear room, concentrating on the UF relays. Inspection and check-out of relays associated with buses 156, 157, 158, and 159 found no failed or questionable equipment. Further review of the circuit and documentation from the event verified that the failure was not in the individual relays or breakers.

Team 2 comprised of Tech Staff Engineers investigated possible failures in the annunciator system. Inspection and check-out from 1PA30J (annunciator input panel) to the Control Room annunciator windows and audible alarms found no failed components. The sequence of events recorder also performed without failure under test conditions. This area was proven not to be an adverse factor in the event.

A third team consisting of Tech Staff Engineers conducted an investigation in an effort to isolate the failure in B-Train Solid State Protection System (SSPS). This team predicted a specific test failure in 1BwOS 3.1.1-21 (SSPS bi-monthly diagnostics test) which

would verify the suspect logic card. Upon performance of the bi-monthly test, the expected failure was documented on the procedure and on test monitoring equipment. The failed component was on the A215 Universal Logic Card which is the decision maker for the 2 out of 4 logic in the RCP-UF circuit. The A215 card was replaced and 1Bwos 3.1.1-21 was reperformed to ensure the replacement card functioned properly and verify the complete SSPS system was operational.

Additional SSPS troubleshooting was completed during this evolution to expose any other degraded or questionable components which could have contributed to the event. Manual logic input testing from the SSPS

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local test panel was conducted to validate test results from the bi-monthly test. Input testing from individual RCP relays to the Control Room verified the complete logic circuit. Inspections were performed on the SSPS Input Bays, Logic Bay backplane wiring, and termipoints to find damaged or questionable components. The RCP UF surveillance was reperformed to satisfy Technical Specification surveillance requirements. These actions verified the single failure found in the SSPS bi-Monthly test and completed the troubleshooting action plan.

B. CAUSE OF THE EVENT:

As outlined above, the root cause of this event was a single failure of a logic card in the B-Train SSPS and there were no other contributing factors.

D. SAFETY ANALYSIS:

This event had no effect on the safety of the plant or the public. The SSPS actuations that were generated were neither desired nor required and were inappropriate for the existing plant conditions. The redundant A train of SSPS was operable and available to initiate the necessary ESF actuations had a valid need occurred. Additionally, it has been concluded that the problems with the train B SSPS processing circuitry would not have precluded its initiation of the appropriate ESF actuations had a valid need occurred.

Under the worst case condition of a valid situation occurring requiring any or all of the ESF actuation functions of SSPS there would still be no effect as this is enveloped in Section 7 of the

Updated Final Safety Analysis Report. The redundancy and physical train separation of the SSPS provide for initiation and actuation of adequate components to perform all required safety functions from a single train of SSPS combined with its associated train of operable output components. The A train of SSPS, including all associated A train components, was operable and available throughout the event.

E. CORRECTIVE ACTIONS:

The failed Universal Logic card was sent to the vendor for a detailed failure analysis. Successful performance of 1BwVS 3.1.1-6 and 1BWOS 3.1.1-21 has proven operability of the RCP UF logic and of B-Train SSPS as a whole.

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F. PREVIOUS OCCURRENCES:

There have been previous occurrences of spurious ESF actuations due to problems in the Train B SSPS circuitry. The previous corrective actions addressed the root and contributing causes. There is no indication of an adverse trend.

DVR 20-1-90-039 / LER 90-018; SPURIOUS TRAIN B SOLID STATE PROTECTION SYSTEM ACTUATIONS DUE TO COMPONENT FAILURE, PERSONNEL ERROR, AND COMPONENT INTERFACE DESIGN DEFICIENCY - 2 REACTOR TRIPS,
2 SAFETY INJECTIONS - cause was attributed to output function of Train B SSPS.

LER 1-92-013; INADVERTANT SAFETY INJECTION ON 1B TRAIN WHILE PERFORMING 1BWOS 3.1.1-21 - The root cause of the event was a spurious train B SSPS safety injection signal on main steam line low pressure due to unknown reason.

G. COMPONENT FAILURE DATA:

MANUFACTURER NOMENCLATURE MFG PART NUMBER
WESTINGHOUSE A215 - Universal 6056D21G01
Logic Card

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Commonwealth Edison
Braidwood Nuclear Power Station

Route #1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

January 29, 1993
BW/93-0040

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

The enclosed voluntary Licensee Event Report from Braidwood
Generating Station is being transmitted to you as a 30-day written
report.

This report is number 93-001, Docket No. 50-456.

K. L. Kofron
Station Manager
Braidwood Station

KLK/AJS/dla
728/ZD85G

Enc: Licensee Event Report No. 93-001-00

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution List

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